

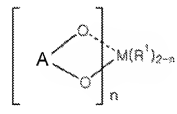
### REMARKS

Claims 1, 6, 8, 10–13, 16–20, 23–28, and 35–42 are pending in the present application. Of these, Claim 40 is canceled, Claims 1, 17, 20, 35, 36, 41, and 42 have been amended, and no claims have been added, leaving Claims 1, 6, 8, 10–13, 16–20, 23–28, 35–39, 41, and 42 for consideration upon entry of the Amendment. A petition for a 1 month extension of time also accompanies this Amendment. Please note that the Specification as referred to herein is the Specification as originally filed as the National Stage Entry under 35 U.S.C. § 371 of PCT/KR2003/002634, filed internationally on December 3, 2003.

#### Amendment to Specification

The paragraphs on p.11, lines 3-11 and on p.13, lines 7-15 in the Specification as have been amended to include a corrected structure for Chemical Formula 1, showing the ligand-catalyst structure in a two-dimensional structural view

#### Chemical Formula 1



in lieu of the empirical formula previously used, and to more specifically describe the substructures “A” as “alkylene, arylene, aralkylene, or alkenylene” for Chemical Formula 1, as indicated by the Examiner. Support for this amendment can be found in the art in general for the exemplary catalysts disclosed in the Examples of the instant Specification.

The paragraph on p. 15, lines 16–23 in the Specification as filed has been amended to show the formal negative charge of each anion of the markush group, and to state that each group is an anion, as indicated by the Examiner. Support for this amendment can be found in the art in general for the exemplary catalysts disclosed in the Examples of the instant Specification.

The paragraph on p.16, lines 15–20 in the Specification as filed has been amended to correct the structures of Chemical Formulas 4a and 4b to show the negative

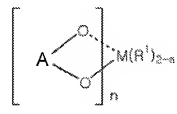
charge for the anion of each formula as indicated by the Examiner. Support for this amendment can be found in the art in general for the exemplary catalysts disclosed in the Examples of the instant Specification.

The paragraph beginning on p. 22, line 20 in the Specification as filed has been amended to include the inadvertently omitted term “or less”, support for which can be found in Examples 1-38 of the instant Specification as filed. No new matter has been added by this amendment.

#### Amended Claims

Claim 1 has been amended to include a corrected structure for Chemical Formula 1, showing the ligand-catalyst structure in a two-dimensional structural view

##### Chemical Formula 1



in lieu of the empirical formula previously used, and to more specifically describe the substructures “A” as “alkylene, arylene, aralkylene, or alkenylene” for Chemical Formula 1. Support for this amendment can be found in the art in general for the exemplary catalysts disclosed in the Examples of the instant Specification.

Claims 1, 20, and 41 have been amended to include the limitations of Claim 40, canceled herewith, to recite monomers of Chemical Formula 5. In addition, Claims 1, 17, 20, and 41 have each been amended to include a limitation to inclusion of more than 30 mol% of a compound of Chemical Formula 5. Support for this amendment to at least 30 mol% can be found in the Examples, specifically Examples 34-39, and on p. 22, lines 20-24 of the instant Specification, and further is definable based on Applicant’s available data and experimentation.

Claim 35 has been amended to correct inadvertent grammatical error by correcting the punctuation linking two clauses and to include the phrase “or Chemical Formula 3. Support for this amendment can be found in the claim as previously filed.

Claims 36 and 42 has been amended to correct a list of anions to show the

anions having the appropriate formal charge.

Claims 38 and 42 has been amended to correct Chemical Formulas 4a and 4b to show the anions having the appropriate formal charge.

No new matter has been introduced by these amendments.

Reconsideration and allowance of the claims is respectfully requested based upon the above amendments and the following remarks.

Claim Rejections under 35 U.S.C. §112, second paragraph

Claims 1, 6, 8, 10-13, 16-20, 23-28, 35-40, and 42 are rejected as allegedly indefinite for failing to particularly point out and distinctly claim the invention. In particular, claim 1 recites a ligand of Chemical Formula 1 which includes a linearly represented dioxygen ligand of general formula  $[-O-(A)-O-]$ , wherein the oxygen atoms are each bonded to a central metal atom (e.g., Pd(II)). The Examiner considers this structure to be indefinite. Applicants herewith amend the structure of Chemical Formula 1 as shown in amended Claim 1 above to clearly represent the bidentate nature of the ligand of general formula  $[-O-(A)-O-]$ , which one skilled in the art will appreciate is broadly representative of any bidentate oxygenated ligand including a carboxylate ligand (where A is the carboxylate carbon), based on the ligands disclosed in the instant Specification.

Claim 35 has been rejected as indefinite for the presence of a period separating two clauses within the claim. Applicants apologize for this inadvertent typographical error and have replaced the period with a semicolon to provide proper claim structure. In addition, the term "or Chemical Formula 3" was also inadvertently omitted and has been included to correctly recite the desired claim limitations.

Claim 42 has been rejected as allegedly indefinite for the recitation of anions without specifying formal charges. Applicants accordingly have corrected each anion group within the claim to clearly recite that each is an anion and to provide each anion with its correct charge.

The above claims, corrected as described herein, should accordingly now be acceptable to the Examiner. No new matter has been introduced with the above amendments. Reconsideration and withdrawal of the rejections is respectfully requested.

Claim Rejections under 35 U.S.C. §102(b)/103(a)

Claims 1, 6, 8, 10–13, and 16–19, 25–28, and 35–42 are rejected under 35 U.S.C. §102(b) as allegedly being anticipated by, or in the alternative under 35 U.S.C. § 103(a) as unpatentable over, U.S. Patent No. 6,455,650 (“Lipian”). Applicants respectfully traverse this rejection.

Lipian discloses a method of making cycloolefin polymer with a cationic Group 10 metal (M) complex and a weakly coordinating anion (WCA) having the formula  $[(R')_2M(L')_x(L'')_y]_b[WCA]_d$ , in which L' is a Group 15 neutral electron donor ligand, L'', is a labile neutral electron donor ligand, the sum of x, y, and z is 4, and b and d are integers. Abstract.

Lipian extensively discloses addition polymers prepared using norbornene-type monomers. Col. 29, line 46 to Col. 38, line 10. The norbornene-type monomers may be substituted with pendant groups including hydrocarbyl or a pendant substituent containing an oxygen atom. Col. 30, lines 1–9. Preparation of the norbornene-type monomers by Diels-Alder reaction is also disclosed. Col. 34, lines 19–65. Cross-linking multicyclic norbornenes are also disclosed as interchain crosslinking units. Col. 32, lines 56–66. A specific cross-linking multicyclic norbornene, exo-trans-exo norbornene dimer, is disclosed in Examples 183, 185, and 186. Col. 83, line 59; Col. 84, lines 22 and 30.

To anticipate a claim under 35 U.S.C. §102, a reference must disclose each and every element of the claim. *Lewmar Marine Inc. v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 1007 (1988).

The method for preparing a cycloolefin polymer containing a polar function al group is effected as claimed hereinabove by use of a bidentate oxygen-containing ligand as applied to the problem of polymerizing a norbornene-based monomer having polar groups of Chemical Formula 5. As claimed, this method provides a product yield of 50% or more, where the monomer solution used comprises more than 20 mol% of norbornene-based monomers. These limitations are not taught or disclosed in Lipian, and further, exemplary support is provided only for a yield of 5% for a homopolymer of norbornenemethylol acetate (Example 134). Further, Lipian discloses predominantly the use of allylic catalysts disclosed therein for the polymerization of silylated

norbornene-based monomers, and does not teach broadly the polymerization of non-silylated or polar group containing compounds (e.g. of Chemical Formula 5) using catalysts having oxygen-containing bidentate ligands.

Further, Lipian, despite its extensive disclosure, is silent as to the ratio of exo isomer to endo isomer for the norbornene monomers, and does not teach or disclose a method for polymerizing norbornene monomers with a specified amount of exo isomer present, or a catalyst mixture for the polymerization, in either the specification or examples.

The Examiner states in the Office Action dated January 11, 2008 that the exo-content of greater than 50% is inherent to the monomers disclosed in Lipian. Applicants respectfully note but disagree with the Examiner's rationale on p. 8 of the Office Action, where the Examiner supports his arguments by reference to Lipian, Cols. 29-32 and the various structures therein. Applicants respectfully point out that, the Examiner's belief notwithstanding, nowhere in this text of Lipian is any disclosure made with regard to use of norbornene-based monomers with an exo isomer content of 50% or more. One skilled in the art will readily appreciate that exo and endo isomers exist for such compounds; Applicants do not argue this point. However, Applicants respectfully point out that for all of its disclosure, Lipian still fails to teach or disclose the instantly claimed ratio of "more than 50 mol% of exo isomer". The structures shown in the above-identified columns of Lipian (Cols. 29-35) are silent as to any disclosure of stereochemistry, and are 2 dimensional representations of bicyclo[2.2.1] structures. One skilled in the art will readily appreciate that where convention deems it important to do so, absent a teaching otherwise, stereochemistry may be indicated by use of such basic and accepted drawing devices as darkened wedges (a substituent emerging from a page), dashed lines (a substituent going into the plane of the page), or 3-dimensional drawings. Lipian uses none of these conventions and fails to illustrate any stereochemistry in these sections by written description, and therefore does not teach any specific isomers. Lipian therefore simply fails to teach all elements of the instant claims, and therefore cannot anticipate the instant Claims.

The Examiner states that a reasonable basis for believing the exo-isomer content is inherent based in the fact that "functionalized norbornene inherently can result in isomers that are endo, exo, or the mixture thereof, depending on the reaction condition."

Again, Applicants do not argue this point, that other isomers are known and could be obtained in the art. Applicants maintain though that application of the instantly claimed method to the particular problem of polymerizing norbornene-based monomers having an exo-isomer content of more than 50 mol% is not taught in Lipian, nor does Lipian teach even an exemplary method of synthesizing norbornene-based monomers with such isomeric ratios as alluded to by the Examiner (Cols. 34-35), and therefore such particular structures and the particular problems of such structures cannot be an inherent feature in the disclosure of Lipian which fails to acknowledge or address them.

In order to support an anticipation rejection based on inherency, an Examiner must provide *factual* and technical grounds establishing that the inherent feature *necessarily* flows from the teachings of the prior art. *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Int. 1990); *In re Oelrich*, 666 F.2d 578, 581, 212 U.S.P.Q. 323, 326 (C.C.P.A. 1981) (holding that inherency must flow as a necessary conclusion from the prior art, not simply a possible one). The Examiner provides reasoning that has already been rebutted by a showing by Applicants of technical data, submitted by declaration under 37 C.F.R. § 1.132, in the Response filed on October 19, 2007, that illustrates the unexpected advantages of Applicants invention with respect to the particular problem of homo and copolymerizing norbornene-based monomers having an exo-isomer content of 50% or greater, as stated hereinabove, with the particular result of achieving a high yield of 50% or greater for the method. Lipian is silent as to and simply does not teach or disclose this, and therefore cannot anticipate the instant claims.

As exemplified by the exo-isomer ratios provided for Preparative Examples 1 and 3-5 (see e.g., 58:42 exo to endo for norbornene carboxylic acid methyl ester in Preparative Example 1, also referred to as "MENB"), Examples 1-9 in the instant Specification teach homopolymerization of high exo MENB. Polymer yields for these examples range from 67.5% to 85.6%. (See Examples 1-9, Specification, pp. 30-34). Further, as shown in the Declaration under 37 C.F.R. § 1.132 in Table 1, submitted previously, polymerization of 5-norbornene-2-carboxylic acid butyl ester having exo/endo ratios of 55/45 (Example A) and 30/70 (Example B) and using identical polymerization conditions including a catalyst mixture comprising palladium acetate (as the precatalyst), tricyclohexyl phosphine (as the first cocatalyst), and N,N-dimethylanilinium tetrakis(pentafluorophenyl) borate (as the second cocatalyst), clearly

demonstrates that the high exo-content Example A achieves a significantly higher polymer yield of 56% using the disclosed catalyst mixture, and consistent with the limitation claimed in claim 1 of a polymer yield of greater than 50%, than is obtained using the high endo Example B, which only results in a polymer yield of 35%. These results clearly illustrate examples that, according to the Examiner's reasoning, should be within the purview of Lipian and evident to all, but yet for which there is no teaching or disclosure of the critical element of exo-isomer content (and hence no anticipation); and for which there would as well be no reasonable expectation of success (and hence no obviousness), based on the results obtained by Applicants which are clearly not taught by Lipian. Applicants do not further reproduce the additional data already submitted and of record in the declaration under 1.132, but therefore respectfully request the Examiner please carefully reconsider Applicant's data submitted in the Response filed October 19, 2007, as effort was made therein to clearly provide an illustration of the insufficiency of Lipian as to its broad applicability to the problems defined by Applicants of polymerizing high exo-content monomer.

Based on the available data, it can be readily appreciated by one skilled in the art that a significant difference does in fact exist in reactivity and conversion yield of the norbornene monomers having different ratios of exo and endo isomers, and consequently there is no factual or technical grounds to support the assertion that the combination of catalyst and norbornene monomer, as disclosed in Lipian to be without a specified ratio of exo isomer to endo isomer, would inherently possess the requisite compatibility and reactivity, such that a yield of greater than 50% would be obtained as instantly claimed in amended Claim 1. For at least these reasons therefore, the limitations of instant Claim 1 are not inherent to Lipian.

In addition, regarding Claim 41, Lipian does not disclose as precatalysts (allyl)Pd(acetyl acetonate), (allyl)Pd(acetate), (acetate)Pd(acetyl acetonate), or a mixture thereof, and therefore fails to anticipate the claim. Reconsideration and withdrawal of this rejection, and allowance of the claim, is respectfully requested.

Therefore, Claims 1 and 41 and their dependents 6, 8, 10-13, 16-19, 25-28, 35-39, and 42 cannot be anticipated by Lipian. Reconsideration and withdrawal of the rejection is respectfully requested.

Further, regarding the rejection of the instant Claims 1, 6, 8, 10-14, 16-19, and 25-30 as obvious over Lipian, Applicants respectfully traverse the rejection.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, or knowledge generally available in the art at the time of the invention, must provide some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). “A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does.” *Id.*

Applicants respectfully assert that, beside Lipian’s failure to teach all elements of the instant independent Claims 1 and 41 as discussed hereinabove, there is no teaching or motivation present in Lipian that would lead one skilled in the art to apply the catalysts of Lipian to a norbornene monomer having an exo-isomer content of 50 mol% or more, and further, that there would be no reasonable expectation for the success of such a combination. By failing to attach any significance to the ratio of exo isomer to endo isomer, Lipian thereby fails also to provide any teaching or suggestion that would lead one skilled in the art to apply the catalysts of Lipian to the problems of polymerizing exo-rich norbornene monomers; indeed, the exemplary data provided by Applicants teaches clearly that no general teaching or disclosure of Lipian would either direct one skilled in the art to apply the particular catalyst combinations claimed in the instant Claims, or would provide one skilled in the art with an expectation that the unexpectedly high yields would be obtained (see in particular the Examples A-E of the data provided in the Declaration under 37 C.F.R. 1.132 of October 19, 2007).

For at least these reasons therefore, Lipian fails to teach all elements of the instant claims, fails to provide a teaching or suggestion that would lead one skilled in the art to modify Lipian to arrive at the invention of the instant Claims and fails to provide a reasonable expectation for success as evidenced by Applicants Exemplary data. Lipian therefore fails to render the instant claims and their dependents



unpatentable. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 20, 23, and 24 also stand rejected under 35 U.S.C. 102(b) as allegedly being anticipated by, or in the alternative under 35 U.S.C. § 103 (a) as obvious over Lipian. Applicants respectfully traverse these rejections.

Regarding the anticipatory rejection, amended Claim 20, Lipian fails to teach or disclose the retardation value of the optical anisotropic film, and the relationship of the refractive indices  $n_x$ ,  $n_y$ , and  $n_z$  of the optical anisotropic film, which satisfies the requirements of Equation 3 in Claim 20.

Also as demonstrated, Lipian does not disclose the molecular weight of the cycloolefin polymer having polar functional groups, or that the polymer as prepared by the method of claim 1 comprise monomers with an exo-isomer content of 50 mol% or more. The only disclosure of molecular weight in Lipian is provided in the examples thereof, and is directed to exemplary compositions that do not include the monomers as claimed in instant Claim 1 from which Claim 20 depends. Specifically, no molecular weight data is thus disclosed in Lipian for the polymers having polar groups and in particular carboxylic acid groups as provided in Examples 117 or 134 of Lipian, or that the polymer is prepared from norbornene monomer having an exo isomer content of 50 mol% or more as claimed in amended instant Claim 1 from which Claim 20 depends, and therefore Lipian does not teach or disclose all elements of the instant claims. For these reasons alone, Claim 20 is neither anticipated by nor obvious over Lipian.

In addition, and as argued previously, the examples of the instant Specification teach the benefit of use of exo-isomers of the polar norbornene compounds, in which the use of exo-rich norbornenes provides a cycloolefin polymer having improved optical anisotropy, and that the adhesion to a PVA polarizing panel is very good. See instant Specification, Examples 40-42 in Table 6, p. 57; Example 43, p. 59; p. 60, lines 1-10.

Applicants again refer to the data provided in the previously attached Declaration under 37 C.F.R. § 1.132 in sections 26-30 and the accompanying EXHIBIT, which clearly show that the exo rich film (Example C) shows better film integrity and lower brittleness relative to that of the endo-rich film (Example E). Lipian is utterly silent as to such properties, and is furthermore silent as to the relationship of exo/endo

isomeric distribution of the component norbornene monomers to the establishment of desired film properties. Lipian therefore cannot anticipate the polymer film of Claim 20 or its dependents as it does not disclose or teach, or distinguish between, the properties of compositionally specific films preparable from the polymerization of norbornene monomers having greater than 50 mol% of exo isomer as claimed in Claim 1. Furthermore, as Claim 20 depends from Claim 1, and it has been shown above that Claim 1 cannot be anticipated by Lipian, Claim 20 cannot therefore be anticipated over Lipian.

Further, regarding the rejection of the instant Claims 20-24 as obvious over Lipian, Applicants respectfully traverse the rejection.

Lipian fails to exemplify, or provide any basic discussion of, the properties of the polymers of Claim 20, or that polymers having the desired properties of refractive index, adhesion, or other mechanical or optical properties can be prepared by the method of Lipian. Lipian is as noted above silent as to the isomeric composition of the constituent monomers of the polymers claimed in Claim 20, and is silent as to the molecular weight of the polymers, and therefore for these reasons at least fails to teach all limitations of the instant claims as required by a prima facie case of obviousness. Further, Lipian fails to provide any teaching or suggestion that would lead one skilled in the art to modify the disclosure of Lipian to provide the desired exo-isomer content of the norbornene monomers used to prepare polymer of Claim 20. Finally, Lipian fails to provide a reasonable expectation that any polymer disclosed therein would possess any of the polymer properties claimed in Claim 20. Lipian thus fails to teach all elements of Claim 20 or its dependents, fails to provide a teaching or motivation that would lead one skilled in the art to modify Lipian to achieve the polymer film of Claim 20, and fails to provide a reasonable expectation that a polymer film prepared according to Lipian would have the desirable properties of Claim 20.

Therefore, Claims 20, 23, and 24 are neither anticipated by nor obvious over Lipian. Nor is there any reasonable expectation that a polymer having polar monomers as claimed in instant Claim 1 would possess the requisite molecular weight or refractive index as claimed, and therefore there is no reasonable expectation that the modification would be successful.

Thus, Lipian fails to teach or disclose all elements of the instant claims and does not teach or suggest modifying the disclosure of Lipian by using the catalyst mixture as claimed in the instant claims, or by selecting from among the myriad number of choices of catalyst components to prepare a catalyst composition that might provide the desired cycloolefin polymer from norbornene monomer having polar groups as argued above. Therefore, Lipian fails to either anticipate Claims 20, 23 or 24 or make these claims unpatentable. Reconsideration and allowance of the claims is respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejections and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,  
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